

PreCalculus Review Sheet Answer Key

1) $2x^2 + y^2 = 3$ ellipse

2) $2x^2 + y = 3$ parabola

3) $2x + y = 3$ none (linear)

4) $2x^2 + 2y^2 = 3$ circle

5) $-2x^2 + y^2 = 3$ hyperbola

6) $x^2 + 2x + \underline{1} + y^2 + \underline{0} = 3 + 1$
 $(x+1)^2 + y^2 = 4$ circle

7) $2x^2 - 4x + \underline{\quad} + y^2 + 4y + \underline{\quad} = -2$
 $2(x^2 - 2x + \underline{1}) + y^2 + 4y + \underline{4} = -2 + 2(1) + 4$
 $\frac{2(x-1)^2}{4} + \frac{(y+2)^2}{4} = \underline{\underline{4}}$
 $\frac{(x-1)^2}{2} + \frac{(y+2)^2}{4} = 1$ Ellipse

8) $-x^2 - 16x + \underline{\quad} + 4y^2 + 32y + \underline{\quad} = 16$
 $-1(x^2 + 16x + \underline{64}) + 4(y^2 + 8y + \underline{16}) = 16 + -1(64) + 64$
 $\frac{-1(x+8)^2}{16} + \frac{4(y+4)^2}{16} = \underline{\underline{16}}$

$-\frac{(x+8)^2}{16} + \frac{(y+4)^2}{4} = 1$ Hyperbola

$$9) x^2 - 2x + \frac{1}{4} + y^2 = 3 + 1$$

$$(x-1)^2 + y^2 = 4$$

Center: $(1, 0)$ radius = 2

$$10) \frac{(y-3)^2}{4} + \frac{(x+1)^2}{5} = 1$$

$$b^2 = 4$$

$$b = 2$$

$$a^2 = 5$$

$$a = \sqrt{5}$$

$$c^2 = 1$$

$$c = 1$$

Center: $(-1, 3)$

vertices: $(-1+\sqrt{5}, 3)$

$(-1-\sqrt{5}, 3)$

$(-1, 3+2) \rightarrow (-1, 5)$

$(-1, 3-2) \rightarrow (-1, 1)$

Foci: $(-1+1, 3) \rightarrow (0, 3)$

$(-1-1, 3) \rightarrow (-2, 3)$

$$11) \frac{(y-1)^2}{4} - \frac{(x+4)^2}{25} = 1$$

Center: $(-4, 1)$

vertices: $(-4, 1+2) \rightarrow (-4, 3)$

$(-4, 1-2) \rightarrow (-4, -1)$

$$a^2 = 4 \quad a = 2$$

$$b^2 = 25 \quad b = 5$$

$$c^2 = 29 \quad c = \sqrt{29}$$

Foci: $(-4, 1+\sqrt{29})$

$(-4, 1-\sqrt{29})$

$$12) \frac{x^2}{100} + \frac{(y+1)^2}{144} = 1$$

Center: $(0, -1)$

$$a^2 = 144 \quad a = 12$$

$$b^2 = 100 \quad b = 10$$

$$c^2 = 44 \quad c = \sqrt{44}$$

Vertices:

$(0, -1+12) \rightarrow (0, 11)$

$(0, -1-12) \rightarrow (0, -13)$

$(0+10, -1) \rightarrow (10, -1)$

$(0-10, -1) \rightarrow (-10, -1)$

Foci:

$(0, -1+\sqrt{44})$

$(0, -1-\sqrt{44})$

$$13) \frac{(x+6)^2}{1} - \frac{(y-1)^2}{9} = 1$$

Center:
 $(-6, 1)$

$$a^2 = 1 \quad a = 1$$

$$b^2 = 9 \quad b = 3$$

$$c^2 = 10 \quad c = \sqrt{10}$$

Vertices:

$$(-6+1, 1) \rightarrow (-5, 1)$$

$$(-6-1, 1) \rightarrow (-7, 1)$$

Foci:

$$(-6+\sqrt{10}, 1)$$

$$(-6-\sqrt{10}, 1)$$

$$14) \text{ From \#8 } \frac{(y+4)^2}{4} - \frac{(x+8)^2}{16} = 1$$

$$a^2 = 4 \quad a = 2$$

$$b^2 = 16 \quad b = 4$$

$$c^2 = 20 \quad c = \sqrt{20}$$

Center:

$$(-8, -4)$$

Vertices:

$$(-8, -4+2) \rightarrow (-8, -2)$$

$$(-8, -4-2) \rightarrow (-8, -6)$$

Foci:

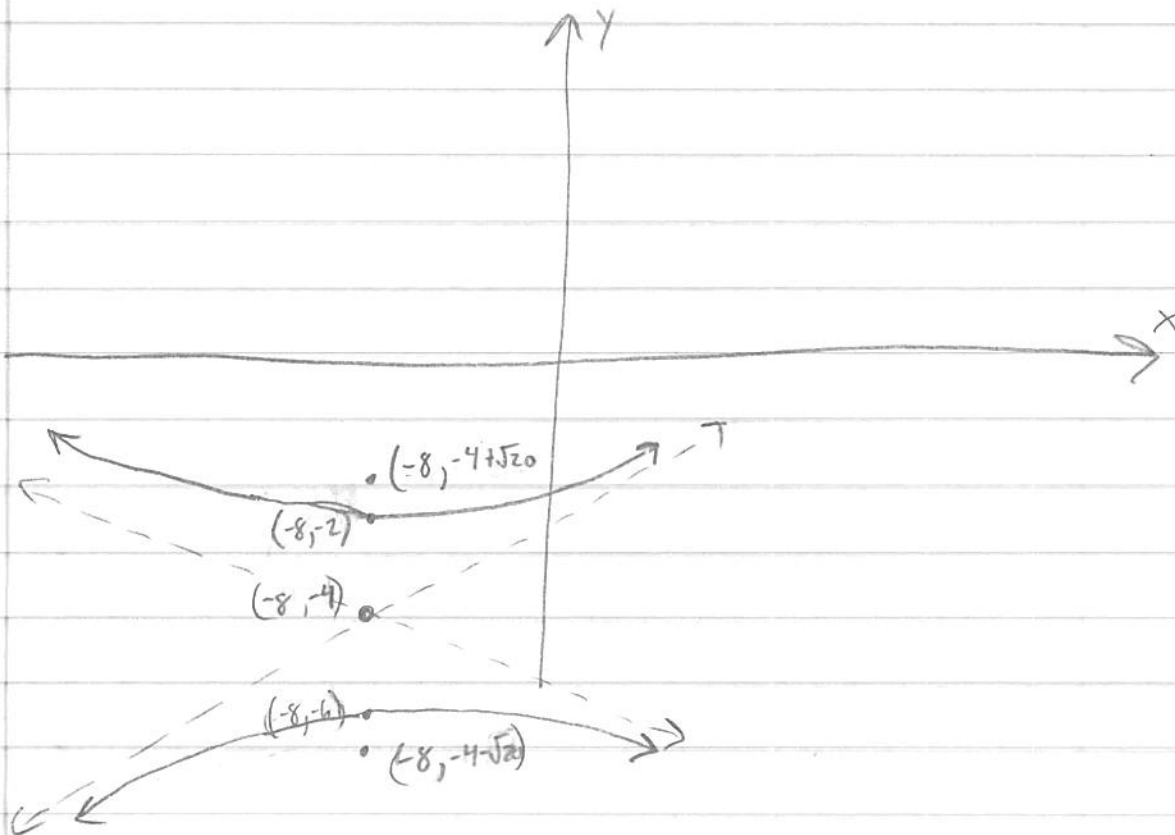
$$(-8, -4+\sqrt{20})$$

$$(-8, -4-\sqrt{20})$$

Asymptotes:

$$(y+4) = \pm \frac{2}{4}(x+8)$$

$$(y+4) = \pm \frac{1}{2}(x+8)$$



15) From #7

Ellipse

$$\frac{(x-1)^2}{2} + \frac{(y+2)^2}{4} = 1$$

center: $(1, -2)$

$$a^2 = 4 \quad a = 2$$

$$b^2 = 2 \quad b = \sqrt{2}$$

$$c^2 = 2 \quad c = \sqrt{2}$$

Vertices:

$$(1, -2+2) \quad (1, 0)$$

$$(1, -2-2) \rightarrow (1, -4)$$

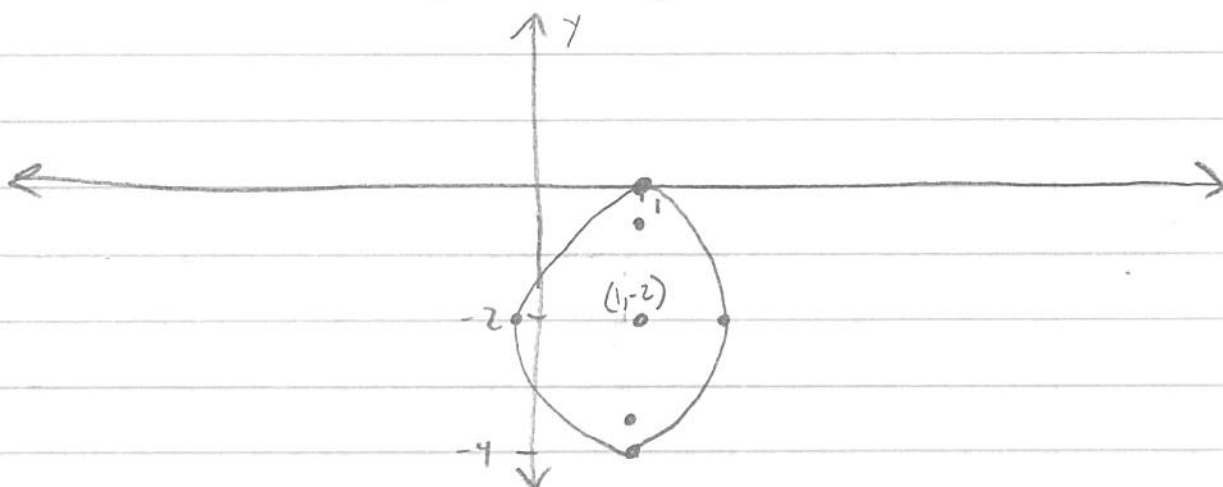
$$(1+\sqrt{2}, -2) \quad (1-\sqrt{2}, -2)$$

$$(1-\sqrt{2}, -2) \quad (1-\sqrt{2}, -2)$$

Foci:

$$(1, -2+\sqrt{2})$$

$$(1, -2-\sqrt{2})$$



$$16) \frac{x^2}{1} - \frac{(y-1)^2}{9} = 1$$

hyperbola

Horizontal Transverse axis

center: $(0, 1)$

$$a^2 = 1 \quad a = 1$$

$$b^2 = 9 \quad b = 3$$

$$c^2 = 10 \quad c = \sqrt{10}$$

Vertices:

$$(0+1, 1) \rightarrow (1, 1)$$

$$(0-1, 1) \rightarrow (-1, 1)$$

Foci:

$$(\pm\sqrt{10}, 1)$$

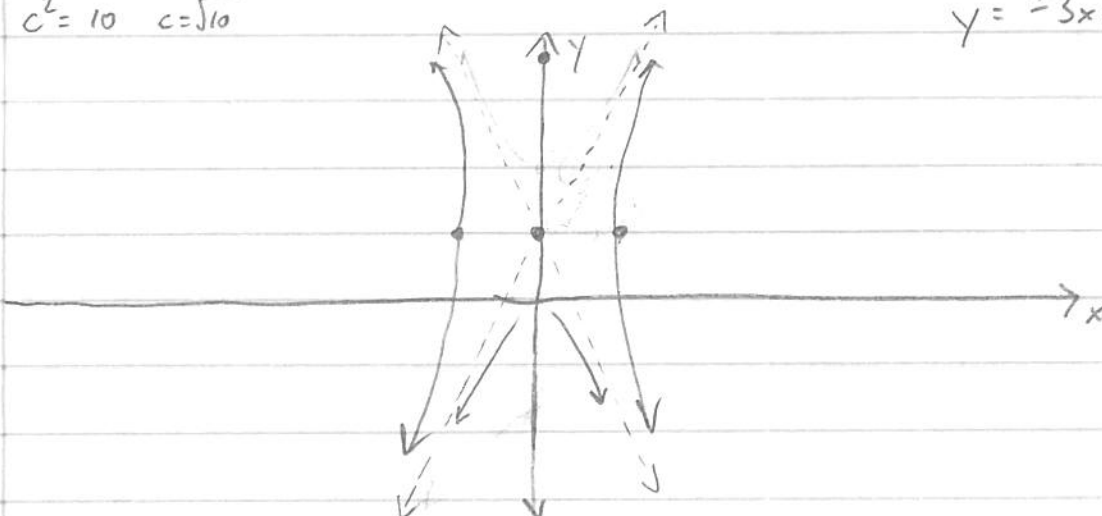
$$(-\sqrt{10}, 1)$$

Asymptotes:

$$(y-1) = \pm \frac{3}{1}(x-0)$$

$$y-1 = \pm 3x$$

$$y = \pm 3x + 1$$



$$17) \frac{(y-3)^2}{4} + \frac{(x+1)^2}{9} = 1$$

Ellipse
Horizontal major axis

Center:
 $(-1, 3)$

$$a^2 = 9 \quad a = 3$$

$$b^2 = 4 \quad b = 2$$

$$c^2 = 5 \quad c = \sqrt{5}$$

Vertices:

$$(-1+3, 3) \quad (2, 3)$$

$$(-1-3, 3) \rightarrow (-4, 3)$$

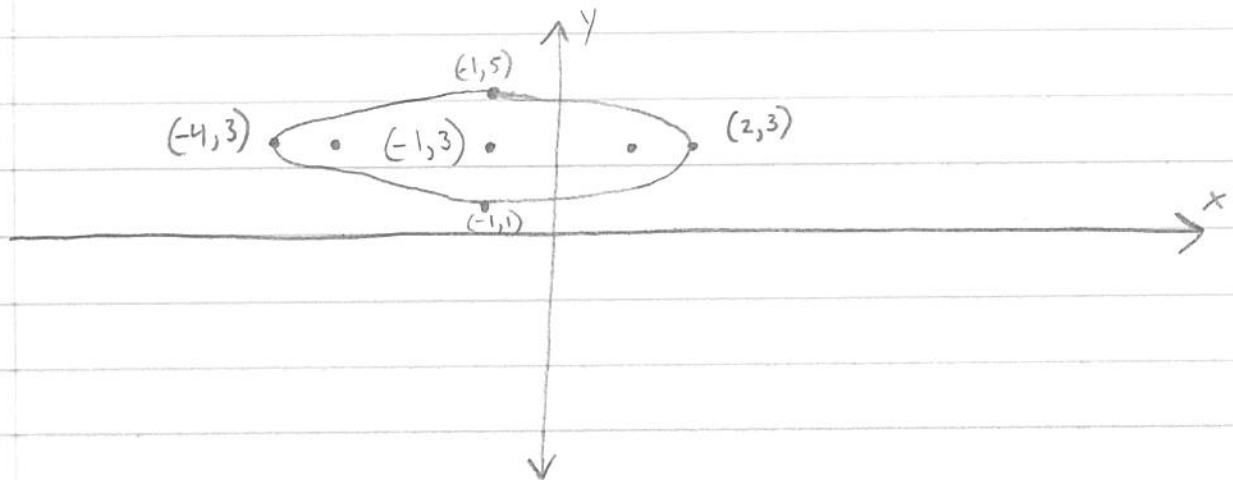
$$(-1, 3+2) \quad (-1, 5)$$

$$(-1, 3-2) \quad (-1, 1)$$

Foci:

$$(-1+\sqrt{5}, 3)$$

$$(-1-\sqrt{5}, 3)$$



$$18) \left(\frac{-1+3}{2}, \frac{4+4}{2} \right) = (1, 0) \text{ center}$$

$$\begin{aligned} \text{Radius} &= \sqrt{(3-1)^2 + (-4-0)^2} \\ &= \sqrt{4 + 16} \\ &= \sqrt{20} \end{aligned}$$

$$\text{radius} = \sqrt{20}$$

$$(x-1)^2 + y^2 = 20$$